

December 27, 2001

MEMORANDUM TO: Ashok C. Thadani, Director
Office of Nuclear Regulatory Research

FROM: Thomas L. King, Director **/RA/**
Division of Systems Analysis and Regulatory Effectiveness
Office of Nuclear Regulatory Research

SUBJECT: SUMMARY REPORT - WORKSHOP ON HIGH-TEMPERATURE GAS-COOLED REACTOR SAFETY AND RESEARCH ISSUES

In SECY-01-0188, "Future Licensing and Inspection Readiness Assessment," dated September 17, 2001, the staff made a commitment to the Commission to develop an advanced reactor research plan to support efficient and effective licensing reviews of future reactors. As input to the research plan, from October 10-12, 2001, the NRC hosted a workshop on the HTGR technology safety and research issues, including the need for future research. The workshop was attended by various national and international experts from the Federal Republic of Germany, United Kingdom, European Union (represented by the German delegate), Peoples Republic of China, Japan, the Russian Federation, Republic of South Africa, International Atomic Energy Agency (IAEA) (part time), as well as from the U.S. Department of Energy (DOE), various DOE national laboratories, and two members of the NRC's Advisory Committee on Reactor Safeguards (ACRS), a representative of the Massachusetts Institute of Technology, and independent consultants. The attached summary report contains the highlights of the workshop.

In summary, the following research topics were considered by the workshop participants to be of high priority:

- (A) High-temperature materials performance - creep-fatigue data; environmental characteristics; and in-service inspection and surveillance plans and techniques;
- (B) Nuclear-grade graphite behavior - measurements of changes in physical properties induced by thermal, radiation and chemical exposures; oxidation measurements in the event of an air-ingress accident; and in-service inspection and surveillance plans and techniques;
- (C) Fuel performance - irradiation testing of fuel simulating steady state, reactivity insertion, and slow heat-up during a transient, and fission product release data;
- (D) Containment performance - thorough evaluation of containment v. confinement for various accident scenarios, radiological source term, and emergency planning assumptions;

- (E) Adequacy of data and analytical tools - developing thermo-fluid dynamics codes as well as severe accident analysis codes; data for code validation and assessment; experimental verification of pebble movement; impact of likely non-uniformity of the central reflector column; and development of probabilistic risk assessment models and approaches; and
- (F) Accident scenarios - modeling air and water ingress events and their implications; fission product release; fuel behavior under accidents; implications of core geometry changes, including non-uniformity of the central reflector column, on progression of accident sequences; and seismic margins.

The information developed on important safety issues and research needs was beneficial in identifying high priority research topics and understanding the extent of existing national and international research efforts in these areas. The NRC insights from the workshop discussions will serve as input to developing an advanced reactor research plan and identifying opportunities for cooperative research.

If you have any questions, I can be reached at 415-7499.

Attachment: As stated **(ADAMS ACCESSION ML013650004)**

cc via e-mail: See attached list

Name	e-mail Address
Ader, Charles	cea@nrc.gov
Arndt, Steven	see@nrc.gov
Bagchi, Goutam	gxb1@nrc.gov
Ball, Syd	sjb@ornl.gov
Bari, Bob	bari@bnl.gov
Boyak, Brent	bboyack@lanl.gov
Brey, H.L.	larrybrey@aol.com
Brinkmann, Gerd	gerd.brinkmann@framatome-anp.de
Burchell, Tim	burchelltd@ornl.gov
Carlson, Donald	dec1@nrc.gov
Chokshi, Nilesh	ncc1@nrc.gov
Clapissou, Guy	gclapiss@nrr.co.za
Corum, J.M.	corumjm@ornl.gov
Cubbage, Amy	aec@nrc.gov
Elzeftawy, Med	mme@nrc.gov
Feltus, Madeline	madeline.feltus@hq.doe.gov
Fischer, David	dcf@nrc.gov
Flack, John	jhf@nrc.gov
Fomichenko, Peter	pf@dhtp.kiae.ru
Gannett, Randy	rogaunt@sandia.gov
Gasparini, Marco	m.gasparini@iaea.org
Hannon, John	jnh@nrc.gov
Horak, W.C.	horak@bnl.gov
Ibarra, Jose	jgi@nrc.gov
Jackson, Diane	dtj@nrc.gov
Kadak, Andrew C.	kadak@mit.edu
Kadambi, N.P.	npk@nrc.gov
King, Thomas	tlk@nrc.gov
LaVie, S.	sfl@nrc.gov
Lee, Richard	jel@nrc.gov
Levin, Alan	ael@nrc.gov
Lois, Erasmia	exl@nrc.gov
Meyer, Ralph	rom@nrc.gov
Murley, Thomas	temurley@erols.com
Muscara, Joseph	jxm8@nrc.gov
Odar, Frank	fxo@nrc.gov
Orechwa, Yuri	yxo@nrc.gov
Pickard, Paul	pspickard@sandia.gov
Rao, Dasari V.	dvrao@lanl.gov
Rubin, Stuart	sdr1@nrc.gov
Scarborough, Thomas	tgs@nrc.gov
Shoop, Undine	uss@nrc.gov
Southworth, Finis	fin@inel.gov
Spore, Jay	jay-spore@lanl.gov
Summers, Lyn	lyn.summers@hse.gsi.gov.uk
Tanaka, Toshiyuki	ttanaka@hems.jaeri.go.jp
Terao, David	dxt@nrc.gov
Tripathi, Raji	rrt1@nrc.gov
Wright, Steven	sawright@sandia.gov
Yuanhui, Xu	xuyuanhui@tsinghua.edu.cn

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OFFICE	DSARE		D:DSARE					
NAME	RTripathi:mmk		TKing					
DATE	12/27/01*		12/27/01*					

Name	e-mail Address
Ader, Charles	cea@nrc.gov
Arndt, Steven	see@nrc.gov
Bagchi, Goutam	gxb1@nrc.gov
Ball, Syd	sjb@ornl.gov
Bari, Bob	bari@bnl.gov
Boyak, Brent	bboyack@lanl.gov
Brey, H.L.	larrybrey@aol.com
Brinkmann, Gerd	gerd.brinkmann@framatome-anp.de
Burchell, Tim	burchelltd@ornl.gov
Carlson, Donald	dec1@nrc.gov
Chokshi, Nilesh	ncc1@nrc.gov
Clapissou, Guy	gclapiss@nrr.co.za
Corum, J.M.	corumjm@ornl.gov
Cubbage, Amy	aec@nrc.gov
Elzeftawy, Med	mme@nrc.gov
Feltus, Madeline	madeline.feltus@hq.doe.gov
Fischer, David	dcf@nrc.gov
Flack, John	jhf@nrc.gov
Fomichenko, Peter	pf@dhtp.kiae.ru
Gannett, Randy	rogaunt@sandia.gov
Gasparini, Marco	m.gasparini@iaea.org
Hannon, John	jnh@nrc.gov
Horak, W.C.	horak@bnl.gov
Ibarra, Jose	jgi@nrc.gov
Jackson, Diane	dtj@nrc.gov
Kadak, Andrew C.	kadak@mit.edu
Kadambi, N.P.	npk@nrc.gov
King, Thomas	tlk@nrc.gov
LaVie, S.	sfl@nrc.gov
Lee, Richard	jel@nrc.gov
Levin, Alan	ael@nrc.gov
Lois, Erasmia	exl@nrc.gov
Meyer, Ralph	rom@nrc.gov
Murley, Thomas	temurley@erols.com
Muscara, Joseph	jxm8@nrc.gov
Odar, Frank	fxo@nrc.gov
Orechwa, Yuri	yxo@nrc.gov
Pickard, Paul	pspickard@sandia.gov
Rao, Dasari V.	dvrao@lanl.gov
Rubin, Stuart	sdr1@nrc.gov
Scarborough, Thomas	tgs@nrc.gov
Shoop, Undine	uss@nrc.gov
Southworth, Finis	fin@inel.gov
Spore, Jay	jay-spore@lanl.gov
Summers, Lyn	lyn.summers@hse.gsi.gov.uk
Tanaka, Toshiyuki	ttanaka@hems.jaeri.go.jp
Terao, David	dxt@nrc.gov
Tripathi, Raji	rrt1@nrc.gov
Wright, Steven	sawright@sandia.gov
Yuanhui, Xu	xuyuanhui@tsinghua.edu.cn